

NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550

MIDTERM EXAM II

11/98 Prof. Powers

- This exam is open book and notes.
- There is a 50 minute time limit.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be *sure* to include units in your answers.
- Please circle or underline your answers.
- Show *ALL* work.

1	
2	
3	
Total	

Name: _____

1. Consider the network connection shown in Figure 1. The insertion loss of the couplers is 0.6 dB larger than the splitting loss (excluding the losses of the pigtails). The insertion loss of the circulator is 1.0 dB (excluding the losses of the pigtails). Each pigtail is 0.5 km long and has a loss per length of $1.0 \text{ dB}\cdot\text{km}^{-1}$. The loss of each splice is 0.5 dB. What fraction of the light inserted at point “A” (on the left) will appear at point “B” (on the right).

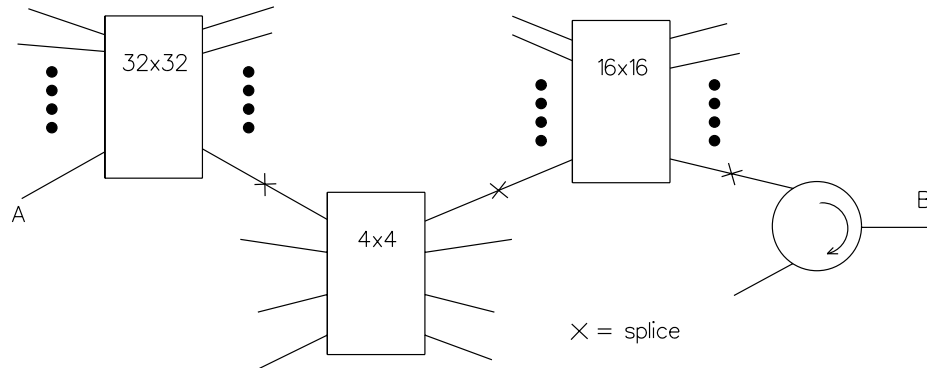


Figure 1: Problem 1.

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2. A surface-emitting LED operating at 1550 nm couples its light into a 62.5/125 graded-index fiber that has a core index of 1.460 and $\Delta = 1\%$. The diameter of the LED emitting region is $100 \mu\text{m}$ and the measured coupling loss into the fiber is 21 dB. Find the value of g for this fiber.
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3. Consider a diode laser at 1285 nm with the operating characteristics shown in Fig 2 for an operating temperature of 20C.
 - (a) Find the threshold current of this laser.
 - (b) Find the incremental quantum efficiency of this laser.
 - (c) Find the threshold current of this laser at 30C if it is also known that the threshold current at 10C is 10.5 mA.

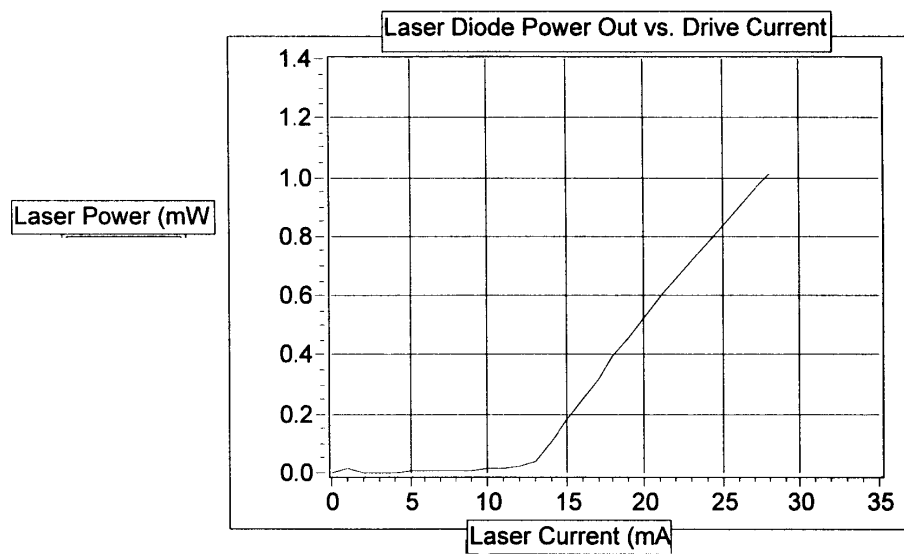


Figure 2: Problem 3.